Social Studies

CHAPTER 2: PART 2

CLIMATE AND WEATHER

Climate Weather and Identity

- Climate and weather have a large influence on how Canadians build their identity.
- We will study the factors that contribute to climate and how theses climates shape identity.

Terminology

- **Meteorology:** The science of weather
- **Weather:** The day to day atmospheric conditions experienced in an area.
  - Today it is 10 degrees and sunny…
- **Climate:** Long term patterns of weather conditions
  - Newfoundland has cool and wet summers

Climate or Weather?

- **Wind forecasted for this afternoon.**
- **Annual precipitation of 200 mm.**
- **Normal July temperature averages 22 degrees C.**
- **Temperatures this week will range between 20 & 30**
- **Vancouver has an annual frost free period of 233 days.**
- **Residents in Florida are preparing to take shelter from a hurricane.**

Climate

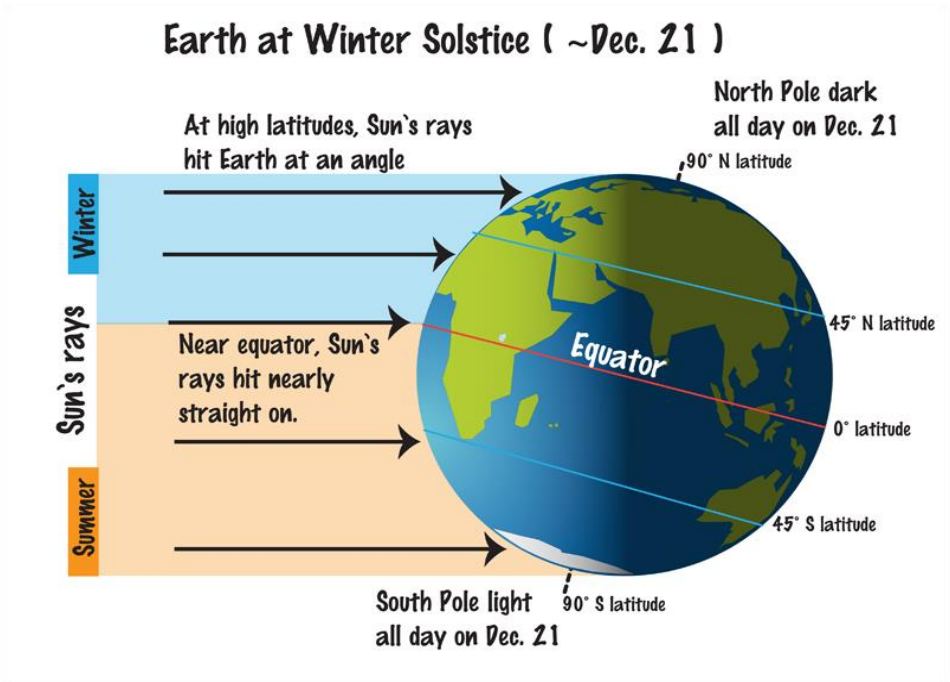
- To describe climate and weather we can discuss several factors including:
  - **Temperature:** The amount of heat energy in the air
  - **Precipitation:** Rain, snow, sleet, or hail that falls to the ground.
  - **Humidity:** The amount of moisture held within the air.
  - **Wind:** The movement of air

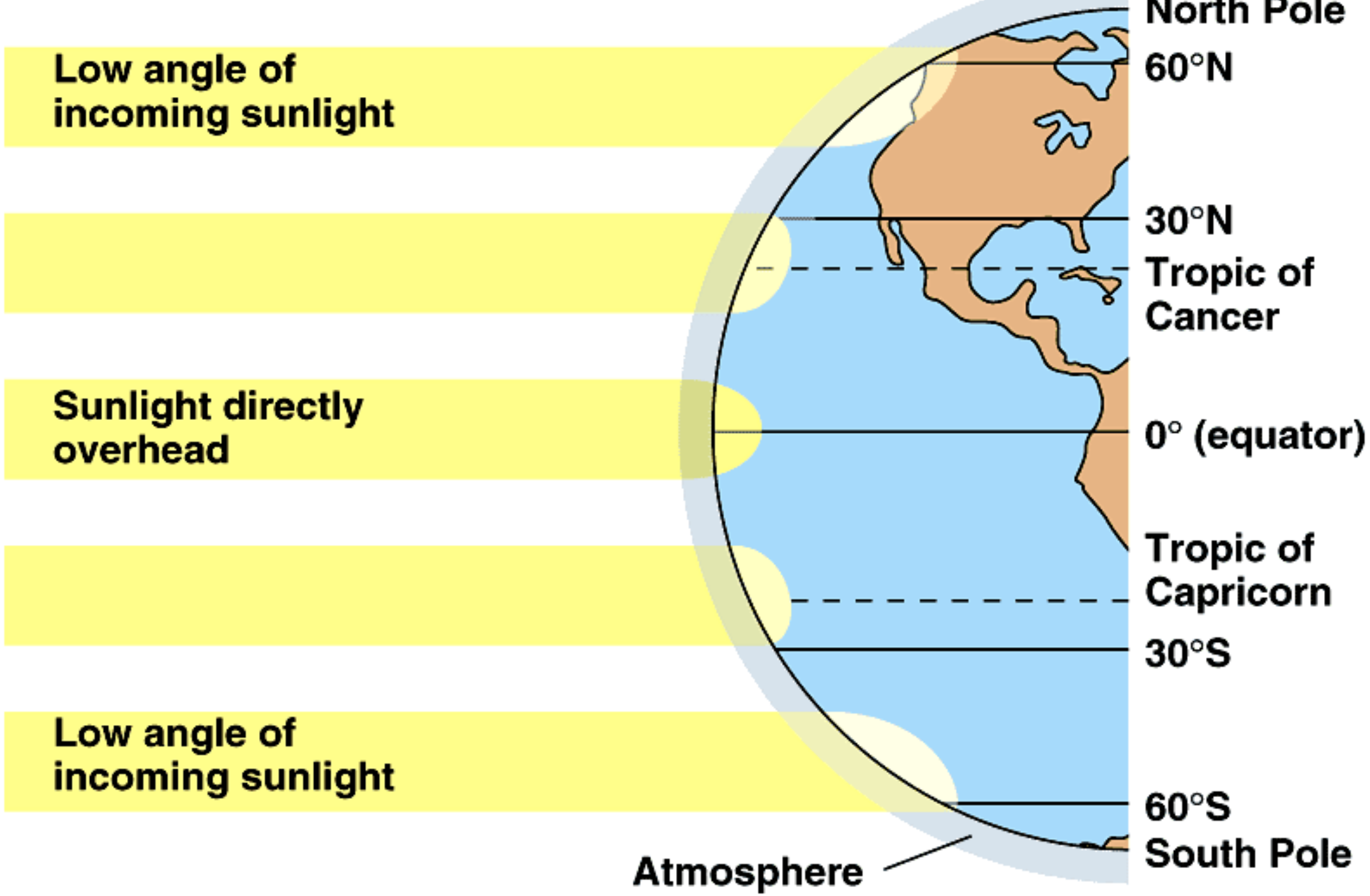
Factors Influencing Climate

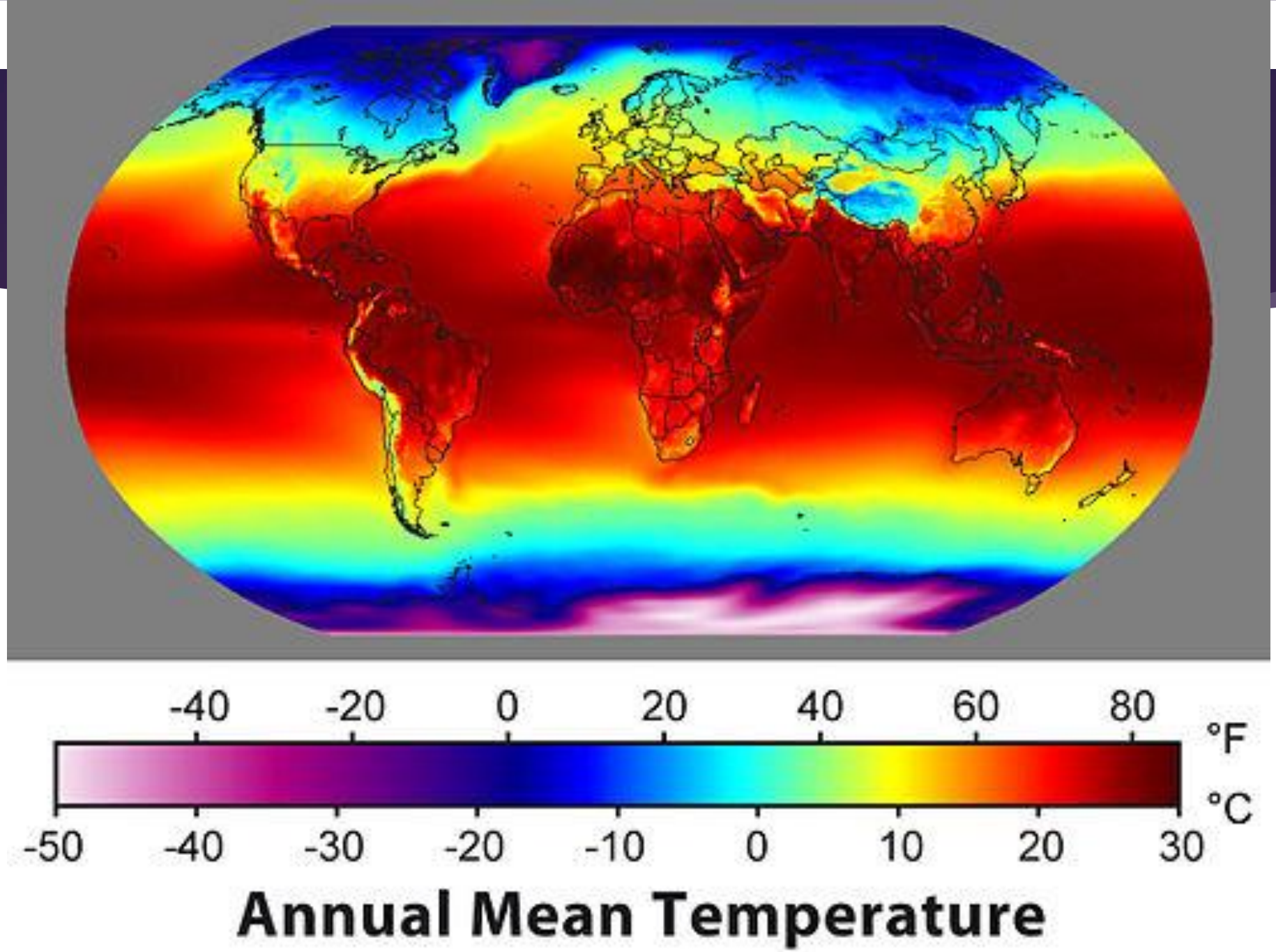
- There are several factors that influence climate"
  - **Global Factors**
    - Latitude
    - Air Masses and Wind
    - Ocean Currents
    - Clouds and Precipitation
  - **Regional Factors**
    - Altitude
    - Bodies of water
    - Mountain Barriers

Latitude

- **Latitude:** Distance north or south of the equator
- Generally as latitude increases temperatures tend to decrease.
- This has much to do with the shape of the earth and the angle at which the sun hits the land
- At higher latitudes the sun has to heat larger areas with the same amount of energy
- Video: Seasons and Latitude





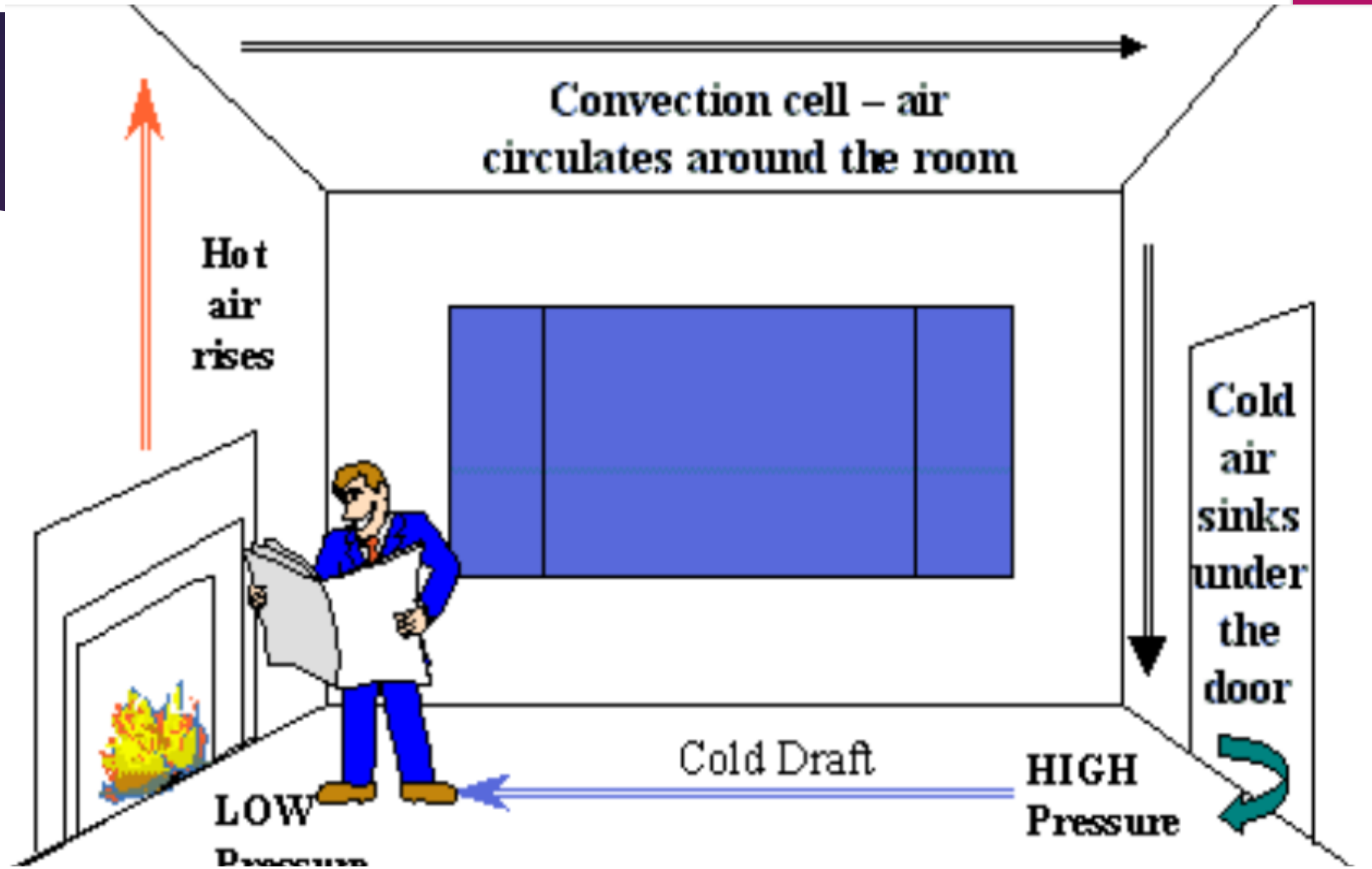

-40
-20
0
20
40
60
80
°F
°C
-50
-40
-30
-20
-10
0
10
20
30
Annual Mean Temperature

What causes wind?

- **Unequal heating causes pressure differences!**

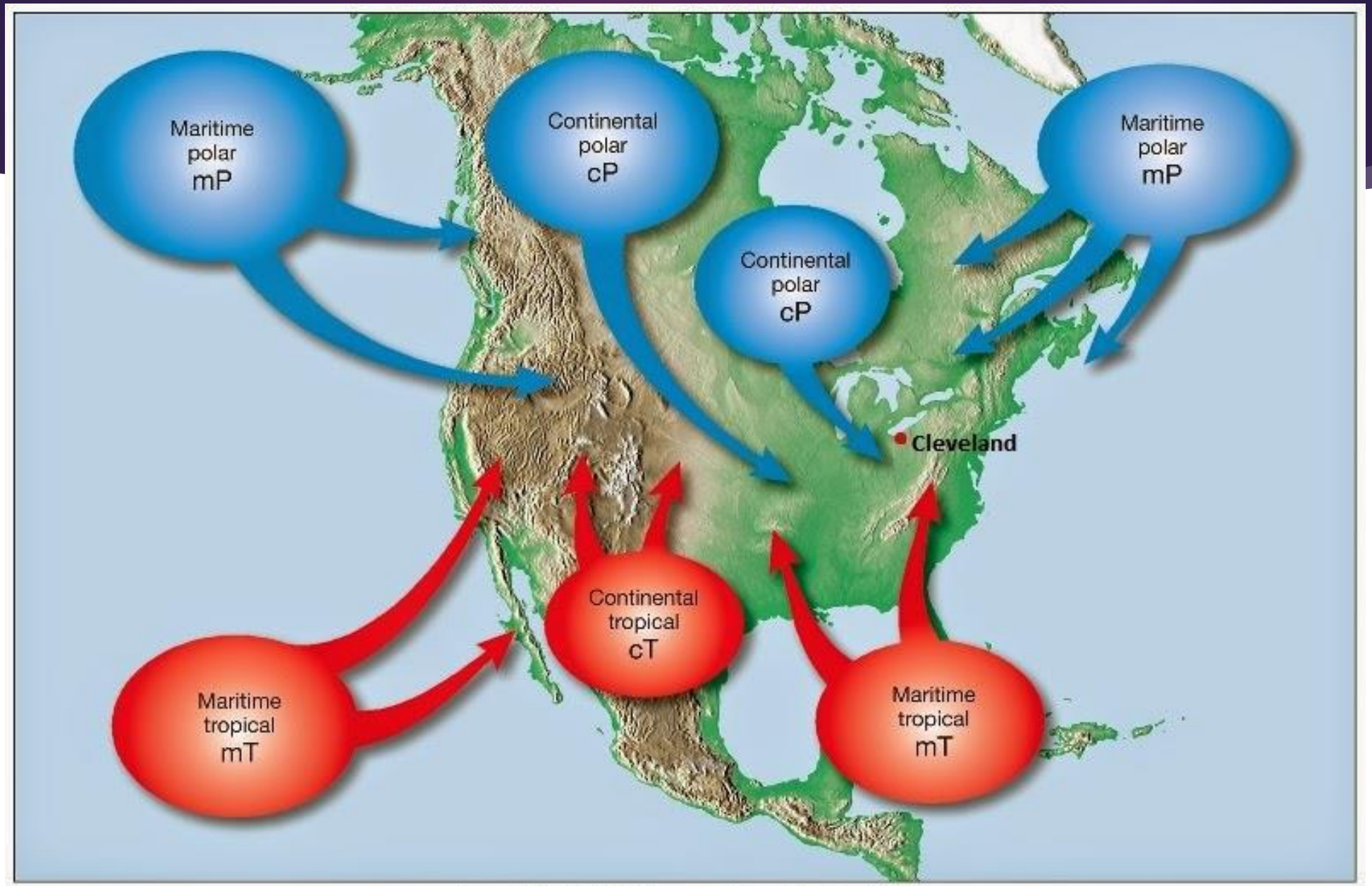
- Cold, heavy air sinks = ***high pressure***
- Warm, expanding air rises = ***low pressure***

- Winds always blow from ***high (cold) to low (warm)*** ****


Convection cell – air
circulates around the room
Hot
air
rises
Cold
air
sinks
under
the
door
Cold Draft
LOW
HIGH
Pressure

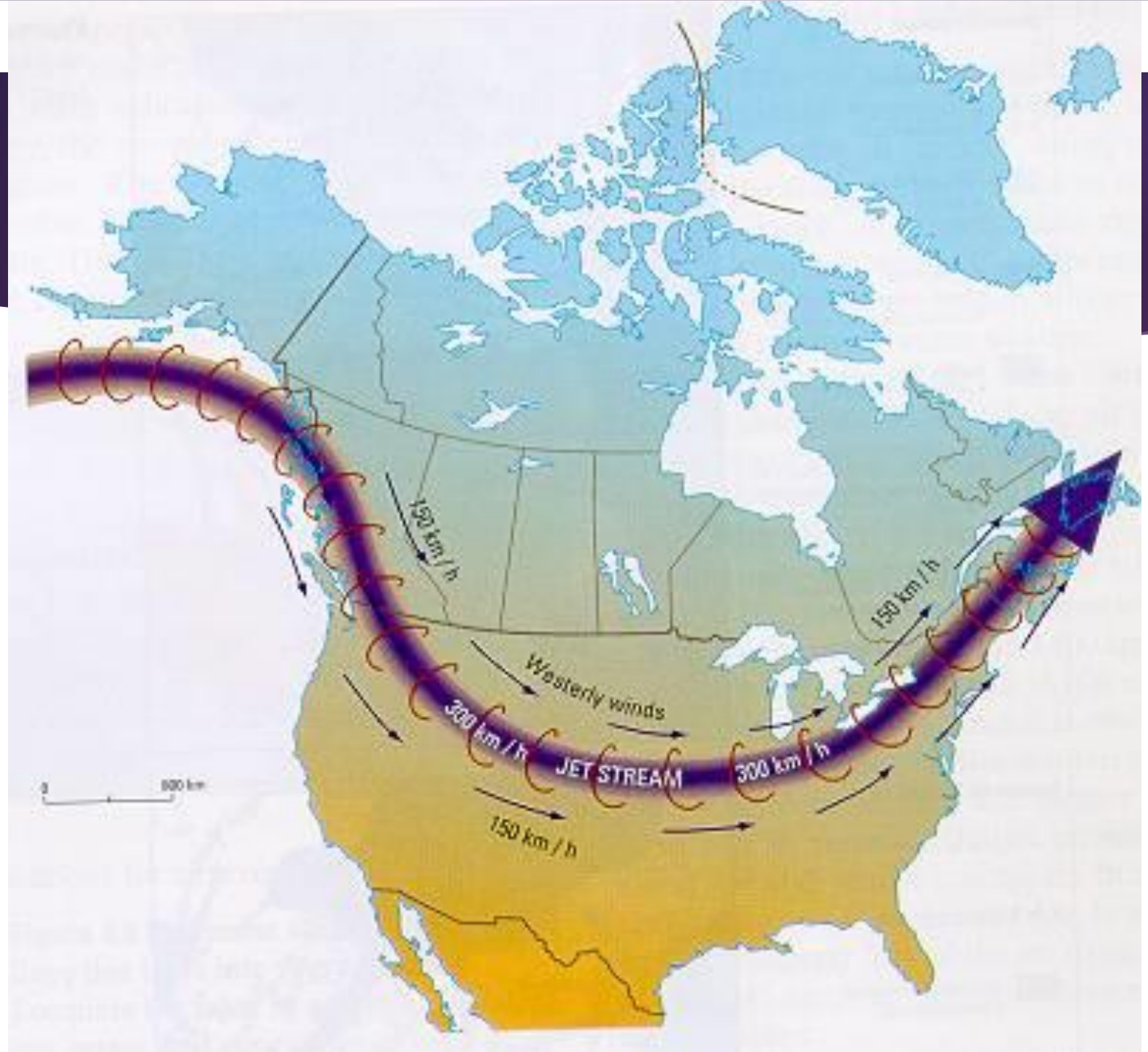
Air Masses and Winds

- Air masses and bodies of water carry with them the characteristics of where they come from.
  - Air masses coming from land are dry
- **Maritime Tropical (mT):** Warm water makes the air warm and moist
- **Maritime Polar (mP):** Cold water makes the air cold and moist
- **Continental Artic (cA):** Cold land makes the air cold and dry
- **Continental Tropical (cT):** Deserts make the air hot and dry


Maritime
polar
mP
Continental
polar
cP
Continental
polar
cP
Maritime
polar
mP
Cleveland
Continental
tropical
cT
Maritime
tropical
mT
Maritime
tropical
mT

Air Masses Continued

- Air masses tend to travel from west to east pushed by the jet stream
- **Jet Stream:** A high and fast wind that flows across North America near the Canada/US boarder
- Canada is most influenced by the polar continental air mass in the winter and the Maritime tropical in the summer


150 km / h
Westerly winds
300 km / h
JET STREAM
300 km / h
150 km / h
150 km / h

Ocean Currents

- **<u>Ocean Current:</u>** Large bodies of water with similar characteristics of heat and density that travel together.
- Ocean currents act like air masses in that they bring with them the characteristics of the places they come from
- Currents that flow from the south are warm bringing warm air and moisture
- Currents that flow from the north are cold bringing cool air and moisture

Clouds and Precipitation

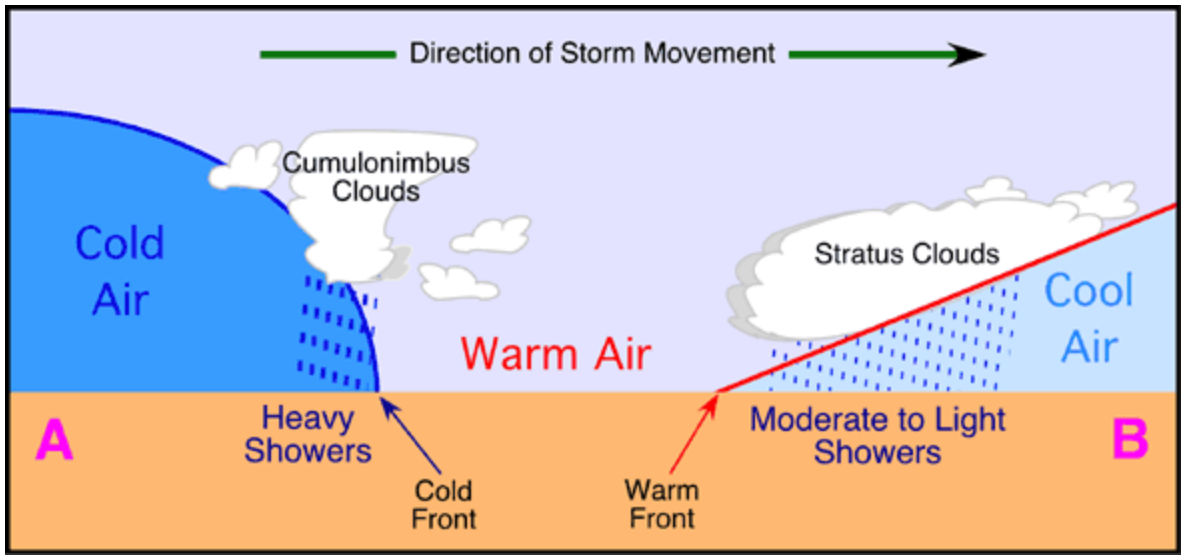
- **Clouds:** Masses of suspended solid or liquid water particles.
- They form when water vapour in the air cools
- **Due Point:** The temperature at which water particles in the air condense and form droplets.
- When droplets become large enough they fall to the earth
- We will learn about three types of precipitation:
  - Frontal precipitation
  - Convectional precipitation
  - Orographic/Relief precipitation

Frontal Precipitation

- **Front:** The leading edge of an air mass
- As fronts pass through an area weather changes.
- Air moves from areas of high pressure to low
- Warm air can force itself up and over a cold mass, this is known as a warm front.
- Cool air can force itself under a warm air mass, a cold front

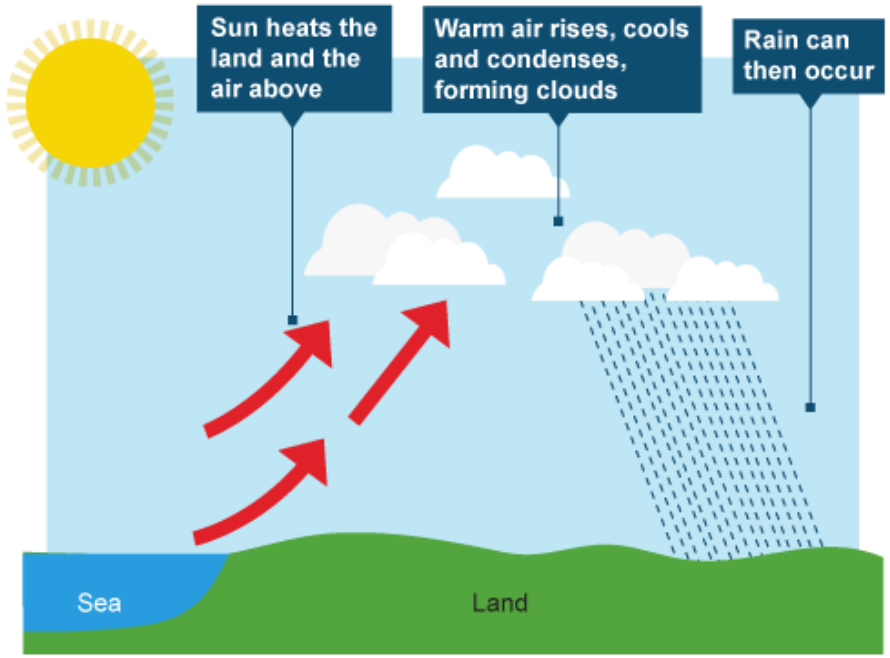
Frontal Precipitation

- Caused when one air mass displaces another.
  - As a cold system (high pressure) moves in it forces warm air to rise.
    - Rain occurs at A
  - The warm air is forced over the cool system.
    - Rain occurs at B



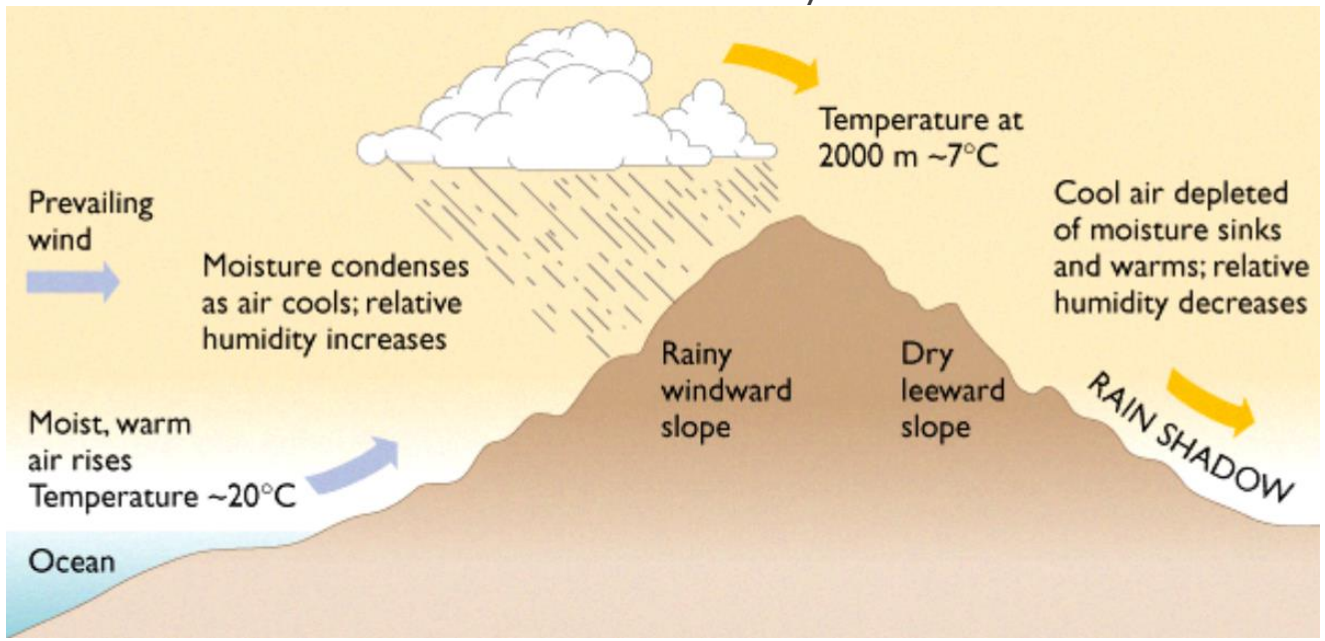
Convectional Precipitation

- Occurs as a result of the vertical movement of a air mass.
- The sun heats the crust, air is forced to rise.
- As it rises it cools and condenses.
- Rain occurs



Relief/ Orographic Precipitation

- Occurs when moist air moves of a mountain barrier.
- As air blows from the ocean it is forced over a mountain.
- It is forced to cool and drop it's moisture as rain.
- On the leeward side of the mountain we find a dry area known as a rain shadow



Regional Factors: Altitude

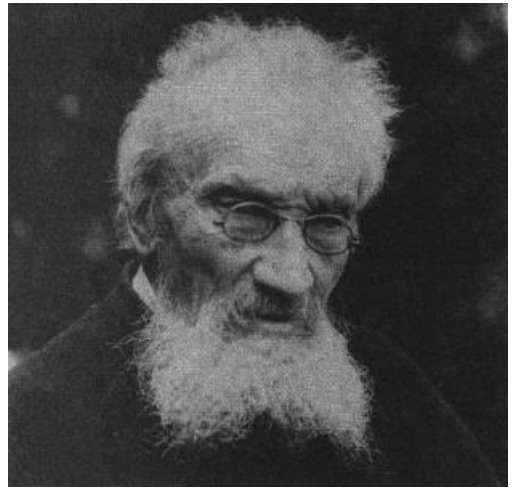
- **Altitude:** height of an object in relation to the ground.
- As altitude increases temperature decreases
- The molecules move farther apart and hold less heat.
- **Environmental lapse rate:** the rate of change of temperature with elevation.

Regional Factors: Bodies of Water

- ***Bodies of water*** provide a moderating effect
  - Water heats and cools slower than land
- Lakes and oceans bring cooling breezes in the summer, and warmer breezes in the winter.

Climate Regions

- **<u>Climate Region:</u>** an area that experiences similar weather conditions within its boundaries throughout the year.
- Climate regions are based on a system developed in 1920 by Wladimir Köppen.
- Köppen's system classifies regions based on:
  - annual temperature
  - Annual precipitation
  - Vegetation
- In Köppen's system there are 5 regions ranging alphabetically from A-E



Canada's Climate Regions

- **A: Tropical Climate:** Canada has none.

Canada's Climate Regions

- **B: Dry Climate**
- Evaporation and transpiration may be greater than precipitation.
- Some are warm, others are cool.
- Found in the north, and in southern Alberta and Saskatchewan.

Canada's Climate Regions

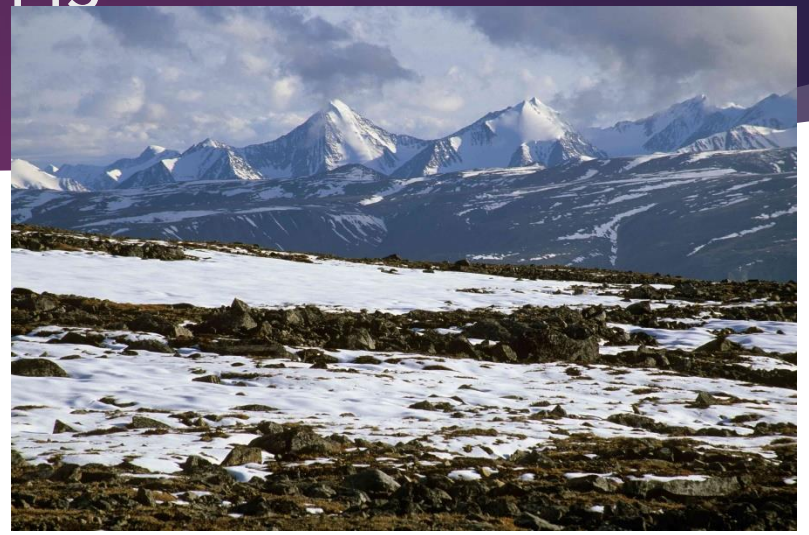
- **C: Warm, moist climates**
- Warm humid summers and mild winters
- Found along the coast of British Columbia

Canada's Climate Regions

- **D: Cool, moist climates**
- Most of Canada
- Ranges from warm climates of southern Ontario to the cold subarctic
- Newfoundland is part of this region

Canada's Climate Regions

- **E: Polar Climates**
- Only found in Canada's North and highland areas
- Covers 25% of the country
- Warmest month less than 10 degrees
- Two types:
  - Tundra
  - Ice Cap



Microclimates

- **Microclimates**: smaller areas within climate regions that do not fit the average conditions.
  - May be warmer, cooler, wetter, or drier.
- Depressions in the land are known as frost hollows
- Windward sides of mountains experience precipitation
- Southern slopes get more sunlight and are better for farming
- Large urban centers are often warmer due to the heat of the buildings, vehicles, and people

Climographs

- A combination of two graphs
  - A bar graph drawn in blue to represent precipitation
  - A line graph drawn in red to represent temperature
  - Temperature and precipitation is measured on the y-axis
  - Months of the year on the x-axis